

**WHAT IS CLAIMED IS:**

1. An exposure apparatus comprising:  
an illumination optical system for  
5 illuminating a pattern of a reflection mask, by using  
light from a light source, wherein said illumination  
optical system includes:  
a field stop that defines an illuminated  
area on the reflection mask, and has an opening;  
10 and  
an imaging system for directing the  
light from the opening in the field stop into the  
reflection mask, the imaging system being a  
coaxial optical system; and  
15 a projection optical system for projecting  
the pattern on the reflection mask onto a substrate,  
wherein a principal ray of the imaging system at a side  
of the reflection mask forming an inclination angle to  
a common axis of the coaxial optical system, the  
20 inclination angle being approximately equal to an angle  
between a principal ray of said projection optical  
system at the side of the reflection mask and a normal  
to a surface of the reflection mask.

25 2. An exposure apparatus according to claim 1,  
wherein said illumination optical system includes a  
plane mirror for reflecting light from the imaging

system and for introducing the same into the reflection mask.

3. An exposure apparatus according to claim 1,  
5 wherein the principal ray of the imaging system at a side of the field stop is approximately parallel to the common axis.

4. An exposure apparatus according to claim 1,  
10 wherein said illumination optical system has an aperture stop at a pupil surface in the imaging system.

5. An exposure apparatus according to claim 4,  
wherein the aperture stop has an opening, and said  
15 illumination optical system has a mechanism for changing a size or a shape of the opening in the aperture stop.

6. An exposure apparatus according to claim 1,  
20 wherein the field stop includes a masking blade that includes plural light-shielding plates.

7. An exposure apparatus according to claim 1,  
wherein the field stop includes an arc slit that has an  
25 arc opening.

8. An exposure apparatus according to claim 7,  
wherein the arc opening has a curvature center on the  
common axis.

5        9. An exposure apparatus according to claim 1,  
wherein the field stop includes:

          a masking blade that includes plural light-  
shielding plates; and

          an arc slit that has an arc opening.

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10. An exposure apparatus according to claim 1,  
wherein said illumination optical system includes:

          a reflection integrator for forming plural  
secondary light sources using the light from the light  
15 source; and

          a mirror system for superimposing light from  
plural secondary light sources on the field stop and  
for forming the arc illuminated area, wherein the arc  
illuminated area has a curvature center on the common  
20 axis.

11. An exposure apparatus according to claim 1,  
wherein the imaging system includes four mirrors.

25        12. An exposure apparatus according to claim 11,  
wherein first and fourth mirrors in the four mirrors  
from the field stop have concave reflective surfaces.

13. An exposure apparatus according to claim 11,  
wherein a third mirror in the four mirrors from the  
field stop has a convex reflective surface.

5        14. An exposure apparatus according to claim 11,  
wherein a second mirror in the four mirrors from the  
field stop has a concave reflective surface.

10        15. An exposure apparatus according to claim 1,  
wherein the imaging system has a pupil surface, and  
includes a mirror that has a reflective surface at the  
pupil surface.

15        16. An exposure apparatus according to claim 1,  
wherein the light from the light source has a  
wavelength of 200 nm or smaller.

20        17. An exposure apparatus according to claim 16,  
wherein the light from the light source has a  
wavelength between 5 nm and 20 nm.

18. A device fabricating method comprising the  
steps of:

25        exposing an object using an exposure  
apparatus; and  
developing the exposed object,  
wherein said exposure apparatus includes:

an illumination optical system for  
illuminating a pattern of a reflection mask, by using  
light from a light source, wherein said illumination  
optical system includes:

5                   a field stop that defines an illuminated  
area on the reflection mask, and has an opening;  
and

                  an imaging system for directing the  
light from the opening in the field stop into the  
10               reflection mask, the imaging system being a  
coaxial optical system; and

                  a projection optical system for projecting  
the pattern on the reflection mask onto a substrate,  
wherein a principal ray of the imaging system at a side  
15               of the reflection mask forming an inclination angle to  
a common axis of the coaxial optical system, the  
inclination angle being approximately equal to an angle  
between a principal ray of said projection optical  
system at the side of the reflection mask and a normal  
20               to a surface of the reflection mask.